UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/015,898	12/17/2001	Hiromi Nakanishi	33035M083	7345

441 7590 09/26/2005

SMITH, GAMBRELL & RUSSELL, LLP
1850 M STREET, N.W., SUITE 800
WASHINGTON, DC 20036

EXAMINER	
PAYNE, DAVID C	
ART UNIT	**PAPER NUMBER**
2638	

DATE MAILED: 09/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/015,898	NAKANISHI ET AL.	
	Examiner	Art Unit	
	David C. Payne	2638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-11 and 13-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-11,13-17 and 19* is/are rejected.

7)☒ Claim(s) *18 and 20-23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. The examiner notes the newly amended claims 1 and 2, which recite inter alia, a back-illuminated phodiode (PD) and a filter slanted at an angle of 4 to 12 degrees to the plane perpendicular to the optical axis. The applicant's argument regarding the back-illuminated photodiode is not persuasive. For reasons repeated from the previous office action, Chua et al. US 5519526 A (Chua) disclosed the use of back-illuminated photodiodes.

2. In addition, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "Applicant's structure can be formed simply by wire bonding, without forming a bump" see remarks p. 11) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

3. Regarding applicant's assertion that "Mitsuda teaches, to those of ordinary skill in the art, an angle of about 45 degrees as the oblique angle. This is because if the angle is less, it would be necessary to place the photo-sensitive area of the PD at a position remote from the filter", see remarks page 10, 3rd paragraph:

   The applicant's assertion is mere speculation. The Examiner can find no teaching in the Mitsuda reference that supports the applicant's assertion. Furthermore, neither Mitsuda nor the applicant makes any claim as to the distal proximity of the PD from the end of the waveguide. And further yet, the distance between the end of the waveguide and the PD is affected by both the angle of the filter to the perpendicular as well as the refractive index of the filter, and therefore the Mitsuda reference

does not place a restriction on the angle of the filter. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to choose any operable range of angles other than zero to the perpendicular in the Mitsuda reference at which to transmit light from the waveguide to the PD as any of those angles will certainly refract light towards the PD.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3, 5, 14, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsuda et al. US 6327407 B1 (Mitsuda) in view of Chua et al. US 5519526 A (Chua), and Ozawa US 5960135 A (Ozawa) or Hauer et al. US 5696862 A (Hauer).

Re claims 1 or 2, Mitsuda disclosed An optical receiver comprising: (a) a substrate (e.g., col./line: 3/30-50); (b) a photodiode (PD) (16 of Figure 3a) placed on the substrate; (c) a light-transmitting medium that: (c1) is placed on the substrate; and (d) a wavelength-selecting filter (e.g., col./line: 14/40-50) that: (d1) is placed at the midpoint of the light-transmitting medium (17 of Figure 12) ; (d2) selects light having a specified wavelength out of light emerging from the light-transmitting medium; and (d3) transmits the selected light to the PD to enable the PD to detect it.

Mitsuda does not disclose wherein the PD is a back-illuminated PD. Chua disclosed a back-illuminated PD (e.g., col./line: 19/5-10). It would have been obvious to one of ordinary skill in the art at the time of invention to use a back-illuminated PD in the Mitsuda invention. One is motivated as such since the detectors can detect very fast data rates up to 60 GHz, as disclosed by Chua see col./line: 19/5-10.

Mitsuda does not disclose that the multi-wavelength light originates entirely from outside. Ozawa disclosed an optical module that filters multi-wavelength light from outside the device (e.g., col./line: 6/1-10). Also Hauer disclosed a wavelength selective filter (Fi1 of Figure 1a) at the end of the fiber that filters multi-wavelength light. It would have been obvious to one of ordinary skill in the art at the time of invention that multi-wavelength light from the outside could be filtered in the Mitusda reference as in the Ozawa reference given that the a WDM optical system will transmit multi-wavelength light from more than one point in the network that will need to be filtered at an optical receiver. Furthermore, while Mitsuda shows the filter at midpoint of the fiber, the function of a filter would not change if it were at the endpoint such as Hauer, since filtering of signals along a path had the same result and therefore obvious to one of ordinary skill to place the filter anywhere along the reception path. Mitsuda claims an oblique angle (Figure 3a) of the filter but not specifically 4 to 12 degrees.

However, it would have been obvious to one of ordinary skill in the art at the time of invention to use any number angles for the filter that could refract light into the PD depending on the desired height of the filter inside of the device or the distance of the PD from the end of the waveguide. Lacking any criticality for the choice of 4 to 12 degrees for the filter angle, the claimed subject matter is not patentable over the prior art.

Re claims 3 and 5, Mitsuda disclosed wherein the light-transmitting medium is an optical fiber, e.g., col./line: 3/30-50.

Re claim 14, Mitsuda disclosed wherein

(a) a groove is formed on the substrate to fix the optical fiber; and (b) an optical pathway-changing groove is formed on the substrate to reflect light having passed through the wavelength-selecting filter into the PD. (Mitsuda - 101a Figure 14)

Re claim 16, Mitsuda disclosed an oblique space with a filter inserted therein (Mitsuda 17 of Figure 12).

6. Claims 4, 6, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsuda et al. US 6327407 B1 (Mitsuda) in view of Chua et al. US 5519526 A (Chua), and Ozawa US 5960135 A (Ozawa) or Hauer et al. US 5696862 A (Hauer) as applied to claims 1 and 2 above and in further view of Takahashi US 6215917 B1 (Takahashi).
Re claims 4 and 6, the modified invention of Mitsuda and Chua and (Ozawa or Hauer) (hereinafter referred to as the Modified-1invention) disclosed the aforementioned invention but does not disclose wherein the light-transmitting medium is an optical waveguide formed on the substrate. Takahashi disclosed a light-transmitting medium optical waveguide formed on a substrate (e.g., col./line: 8/9-20). It would have been obvious to one of ordinary skill in the art at the time of invention to form a substrate based waveguide rather than an optical fiber to enable assembly without having to align and insert or couple fiber to the optical receiver.

Re claim 15, the modified invention (Modified-1) disclosed wherein
(a) a groove is formed on the substrate to fix the optical fiber; and (b) an optical pathway-changing groove is formed on the substrate to reflect light having passed through the wavelength-selecting filter into the PD. (Mitsuda - 101a Figure 14)

Re claim 17, modified invention (Modified-1) further disclosed an oblique space with a filter inserted therein (Mitsuda 17 of Figure 12).

7. Claims 8 - 11, 13, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsuda et al. US 6327407 B1 (Mitsuda) in view of Chua et al. US 5519526 A (Chua), and Ozawa US 5960135 A (Ozawa) or Hauer et al. US 5696862 A (Hauer) as applied to claims 1, 2 and 5 above and in further view of Okada et al. US 6567590 B1 (Okada).

Re claims 8, 9 and 10, the modified invention of Mitsuda and Chua and (Ozawa or Hauer) (hereinafter referred to as the Modified-2 invention) disclosed the silicon device invention but does not disclose a Silicon (Si) or ceramic substrate or a SiO_2 waveguide specifically. Okada disclosed the use of Silicon and Ceramic substrates (e.g., col./lines: 8/5-10). It would have been obvious to one of ordinary skill in the art at the time of invention to use Silicon and Ceramic substrates in the Modified-2 invention since ceramic or plastic substrates allow the path conversion groove to take an arbitrary shape with arbitrary slanting angles. The ceramic substrate is an insulator, which is convenient for insulating the parts electrically. On the other hand, the silicon single crystal substrate has an advantage of making the path conversion groove by anisotropic etching facilely. In the case of the ceramic substrate, the path conversion groove can be formed by mechanical dicing, see Okada e.g., col./lines: 12/35-50. Similarly, Okada disclosed a SiO_2 waveguide, col./lines: 16/10-15, which is an equally common material for the matching of silicon substrates.

Re claim 11, the Modified-2 invention disclosed wherein the fiber groove area is covered with resin (Mitsuda - col./line: 3/35-40). However, it does not disclose wherein the PD, the wavelength-selecting filter are covered with a transparent resin. Okada disclosed the use of resin to encapsulate other components such as a transmitter and PD (Figure 13). It would have been obvious to one of ordinary skill in the art at the time of invention that resin is useful for fixing and sealing all these elements to the substrate since a covering of resin over the area would cover all components in one step without the need of additional bonding steps and further work to seal out environmental hazards.

Re claims 13 and 19, the modified invention (Modified-2 invention) disclosed the aforementioned invention but does not disclose wherein an amplifier is provided on the substrate to amplify the photocurrent generated by the PD or the use of a ferrule on the optical fiber. Okada disclosed the use of a ferrule (74 of Figure 15) and amplifier (81 of Figure 15) connected to the PD. It would have been obvious to one of ordinary skill in the art at the time of invention to use a ferrule in the Modified-2 invention to secure the fiber end from breaking and an amplifier to magnify the received optical

signals for further processing at levels compatible with electronic circuits.

Allowable Subject Matter

8. Claims 18 and 20-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David C. Payne whose telephone number is (571) 272-3024. The examiner can normally be reached on M-F, 7a-4p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dcp

David C. Payne
David C. Payne
Patent Examiner
AU 2638